Disease Prevention and Health Promotion

How Integrative Medicine Fits

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As a discipline, preventive medicine has traditionally been described to encompass primary, secondary, and tertiary prevention. The fields of preventive medicine and public health share the objectives of promoting general health, preventing disease, and applying epidemiologic techniques to these goals. This paper discusses a conceptual approach between the overlap and potential synergies of integrative medicine principles and practices with preventive medicine in the context of these levels of prevention, acknowledging the relative deficiency of research on the effectiveness of practice-based integrative care. One goal of integrative medicine is to make the widest array of appropriate options available to patients, ultimately blurring the boundaries between conventional and complementary medicine. Both disciplines should be subject to rigorous scientific inquiry so that interventions that are efficacious and effective are systematically distinguished from those that are not. Furthermore, principles of preventive medicine can be infused into prevalent practices in complementary and integrative medicine, promoting public health in the context of more responsible practices. The case is made that an integrative preventive approach involves the responsible use of science with responsiveness to the needs of patients that persist when conclusive data are exhausted, providing a framework to make clinical decisions among integrative therapies.
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Introduction

The dividing line between preventive medicine and public health practice is far from distinct, as is that between prevention and treatment. The purview of preventive medicine has traditionally been described to encompass primary, secondary, and tertiary prevention in the construct usually attributed to Leavell and Clark.[1] Others have expanded on this construct; quaternary prevention focuses on reducing overmedicalization and protecting patients from unnecessary or excessive invasive interventions,[2] whereas primordial prevention focuses on the alteration of societal (i.e., environmental, economic, social, behavioral, cultural) structures that affect disease risk.[3]

This paper discusses a conceptual approach between the overlap and potential synergies of integrative medicine and preventive medicine in the context of these levels of prevention, and represents an update of a prior paper on this topic commissioned by the then IOM (now National Academy of Medicine), and placed in the public domain.[4]

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Integrative Medicine and Nomenclature

Integrative medicine, a concept developed over the past few decades,[5] refers to the fusion—by various means, and to varying degrees—of conventional medical practice and some of the practices that fall under the complementary and alternative medicine (CAM) rubric.[5,6] Integrative medicine thus offers, in theory at least, the opportunity to combine the "best" of the conventional healthcare system and practices and providers commonly considered to be CAM,[7] and thereby produce better outcomes, measured in terms of symptom relief, functional status, patient satisfaction, and perhaps cost effectiveness.[8] Integrative medicine is necessarily "holistic" in the sense that somatic, emotional, and spiritual health are considered integral to overall health.[9] These definitions are inherently problematic; what exactly comprises spiritual health, or whether this is the appropriate realm of the physician, is debated.[10,11] Further, integrative medicine advocates are accused of creating a forced dichotomy between an idealized patient-centered biopsychosocial approach[12] incorporating CAM and "good conventional medicine."[13] A rationale for integrative medicine depends largely on a rationale for CAM, as CAM tends to be the limiting element in efforts to advance integrative care.

The term CAM is used to describe diverse medical practices not routinely taught in mainstream medical education.[6] "Alternative" denotes that such practices are

defined by what they are not, and that they are exclusive of mainstream health care. "Complementary" implies that these practices are supplemental to conventional health care. The discrepancy in suggesting that such practices are both alternative and complementary to mainstream care has been noted.[4,14,15]

Such challenges to the nomenclature notwithstanding, CAM has been the most widely used academic appellation, its primacy conveyed by its incorporation into the title of the NIH National Center for Complementary and Alternative Medicine, recently renamed to the National Center for Complementary and Integrative Health, acknowledging that pure "alternative medicine" is rare, and that "integrative" better conveys prevalent practice patterns.[6] Despite institutionalization of this terminology, this broad-based categorization overlooks necessary nuance. "CAM" and "integrative" thus encompass practices and practitioners inside and outside of the mainstream, as well as approaches rooted in historic or cultural contexts, unconventional diagnostics and diagnoses, new and untested approaches, and off-label use of conventional therapies. These terms also encompass therapies and approaches that have historically been embraced by CAM clinicians but are recently becoming mainstream (such as some mind–body therapies and interest in the human microbiome beyond gastrointestinal conditions).[16–18]

Interest in and use of complementary health approaches has remained constant in recent years in adults[19] and children[20] after a rise in use between 1990 and 1997.[21] One third of the adult population[19] and 12% of children[20] have used at least one CAM therapy. The majority of patients seek CAM approaches to complement rather than substitute for conventional care most often for pain and chronic musculoskeletal conditions.[22]

Americans spent an estimated $33.9 billion on CAM services in 2007.[23] The use of CAM is more prevalent among female, better-educated, higher-income populations[21,22] with chronic and degenerative conditions.[20,24,25] Predictors of CAM use include a holistic philosophical orientation to health and life, a chronic health condition, environmentalism, feminism, and an interest in spirituality and personal growth psychology.[25] Other studies show a relationship to health-promoting lifestyle choices: Regular physical activity, infrequent to moderate alcohol consumption, and being a former smoker are associated with CAM use.[26] Although research findings vary, common reasons that people choose CAM include dissatisfaction with conventional care; a desire to avoid side effects of conventional medicine and treatments; an interest in and greater knowledge of how nutritional, emotional, and lifestyle factors affect health; and a broader focus on disease prevention and overall health.[21,24,25]

Despite prevalent CAM usage, fewer than 40% of CAM patients disclose this information to their mainstream physicians, indicating an important disconnect between patient preferences and comfort in sharing these views.[21,25,27–30] This salient deficiency in provider–patient communication[28–30] might reflect mistrust, dissatisfaction with the conventional healthcare system,[25] or a response to the perceived receptivity of conventional providers.[4]

Therefore, a case may be made to responsibly guide patients in CAM therapies based on interest and in accordance with scientific evidence. Because this guidance should by no means supplant conventional treatments, an argument for an integrative approach emerges: Patients should ideally receive expert guidance across the availability of treatments that may result in improved health.[4]

Integrative Medicine Across the Prevention Spectrum

As behavioral and lifestyle choices account for the majority of premature mortality in the U.S.,[31] targeting these areas can potentially provide the greatest benefit. In 2010, the leading cause of death in the U.S. was tobacco use, which resulted in some 435,000 deaths, or 18.1% of total deaths. Closely following was diet and lack of physical activity, resulting in 400,000 deaths.[31]

The following sections discuss the potential for integrative medicine across the prevention spectrum. By and large, the effectiveness of integrative approaches in health promotion or disease prevention is not fully elucidated; data derived from direct tests of integrative care models are promising but preliminary.[32–35]

Integrative Medicine in Primary Prevention

Among the means to promote lifestyle change is modeling (i.e., being an exemplar of) healthy behavior, notably diet and physical activity. Physicians that practice healthy behaviors tend to emphasize these behaviors in patient care; consequently, patients of these physicians generally receive stronger, more pronounced, and more specific advice regarding lifestyle change.[36,37] Physicians who exercise regularly are more likely to counsel their patients to do so; nonsmokers are more likely to emphasize the risks of smoking.[38]

A number of integrative health organizations encourage members to model healthy lifestyle behaviors, including the Academy of Integrative Health & Medicine[39] and the American Association of Naturopathic Physicians.[40] Among some integrative health educational

institutions, a culture of wellness exists, where healthy food choices are readily (if not exclusively) available and faculty model healthy behaviors.

Furthermore, a number of CAM whole systems consider dietary habits and therapeutic nutrition as a cornerstone of health, including Traditional Chinese Medicine,[41] Ayurveda,[42,43] and naturopathy.[40,44] Some dietary guidance is consistent with current mainstream recommendations for chronic disease prevention,[45] whereas some traditional recommendations conflict.

Challenges (and opportunities) also exist in synergizing primary prevention with integrative healthcare. A sizable proportion of patients oriented toward CAM tend to be skeptical of preventive interventions, especially childhood vaccination.[46,47] Anti-vaccine views[48] and increases in vaccine-preventable illnesses are associated with care from CAM providers.[49] An evidence-based integrative approach in the context of "holistic prevention," emphasizing the patient–provider relationship,[50] with a sympathetic understanding of parental concerns can potentially increase immunization rates in parents that would otherwise be mistrustful of more-conventional clinicians,[46] thus protecting public health in the context of providing care that is responsive to the needs of CAM-oriented patients.

Secondary Prevention and Integrative Medicine

Integrative medicine has the potential to improve rates of screening and uptake of preventive services through an emphasis on a strong therapeutic alliance, prevention, teaching, interprofessional, and holistic care.[51] Nationally, screening rates for preventive services are considerably lower than ideal[52]; much of the blame can be placed on lack of emphasis and training in health promotion and disease prevention as well as the burdens of a healthcare system that constrain primary care visits to suboptimal levels.[53–55] Abbreviated primary care encounters, coupled with barriers to access, tend to compromise continuity of care as well.[55]

As prevention and population health activities occur in almost all healthcare settings,[56] clinicians can potentially improve screening rates and utilization of preventive services and enhancing risk-reduction efforts for chronic diseases with strong diet and lifestyle associations, namely, cardiovascular disease, diabetes, and certain cancers.[57] Despite this potential, the authors are not aware of evidence of enhanced screening and preventive services in integrative medicine.

Many CAM approaches have demonstrated promise in treating early disease or risk factors such as improving the lipid profile,[58] reducing inflammation,[59] controlling serum glucose, and reducing blood pressure.[60–64] By using these in combination with comprehensive lifestyle change, mind–body interventions, and mainstream preventive recommendations[65] with a strong therapeutic alliance, the potential to improve outcomes rationally follows.

In certain instances, an integrative approach can be used to enhance adherence with conventional therapies, such as using the nutritional supplement coenzyme Q10 to reduce statin-induced myopathy[66] (though other studies demonstrate a lack of benefit)[67]; probiotics to reduce antibiotic-associated diarrhea[68–70]; licorice and its derivatives to potentiate the effects of cortisone[71] and reduce non-steroidal anti-inflammatory drug–associated gastropathy[72]; and a variety of integrative approaches to improve quality of life and adverse effects associated with cancer chemotherapy.[73]

Tertiary Prevention and Integrative Medicine

Many lifestyle programs demonstrate effectiveness for tertiary prevention of cardiometabolic disease.[74–76] Though aspects of such programs have now arguably been conventionalized (i.e., diet and lifestyle), the blending of lifestyle, dietary supplements, and mind–body interventions is certainly representative, if not diagnostic, of integrative care.[4]

Integrative healthcare approaches for chronic disease can improve functionality, reduce morbidity, improve quality of life, and directly influence disease processes. The quality of evidence for CAM therapies is mixed for treating chronic conditions with significant public health impact.[77] Nutritional supplements such as fish oil,[78] chromium,[79] alpha-lipoic acid,[80] herbal medicines,[81] and mind–body techniques[82] have been used to treat Type 2 diabetes mellitus. Hyperlipidemia can be treated with therapeutic diets consisting of functional foods,[83,84] nutritional supplements, and herbal medicines.[58] Manual therapies such as massage can be useful for osteoarthritis,[85] as well as acupuncture,[86] and nutritional and herbal supplements.[87] An anti-inflammatory diet,[59,88] nutritional supplements, manual therapies, and other CAM therapies have shown promise in the management of rheumatoid arthritis.[89]

The public health impact of obesity and its related sequelae is unparalleled in the U.S., while the prevalence is quickly rising throughout the rest of the world.[90] Integrative medicine has the potential to add to obesity prevention and control efforts by emphasizing nutrition, stress reduction,[91] and exercise.[92] There also tends to be an emphasis on dietary supplements, although the scientific evidence underlying such recommendations has long been suspect.[93,94]

At least 13% of outpatient visits are attributable to medically unexplained symptoms[95,96] (also known as

somatoform disorders) such as chronic fatigue syndrome, irritable bowel syndrome, fibromyalgia, chronic Lyme disease,[97] and chronic unexplained pain,[98] which are often complicated by concurrent psychological distress and strong emotions.[97,99] Mainstream care for patients with these conditions is often frustrating, usually resulting in extensive diagnostic workups and significant iatrogenic complication rates.[95,100] In one study, a majority of primary care physicians described attitudes toward patients as negative and dismissing,[101] and another study found substantial discordance between patient and physician treatment goals. [102]

As is true of many health conditions that are poorly understood and often resistant to conventional treatments, medically unexplained conditions often compel patients to seek CAM.[97,103–107] The holistic nature of integrative care, with an emphasis on mind–body medicine, often results in recommendations incorporating psychological and somatic therapies.[9,108,109]

CAM therapies for pain control vary in demonstrated efficacy, spanning mind–body therapies such as meditation[110,111] and biofeedback,[112] to tai chi,[113] acupuncture, yoga, hypnosis, chiropractic, nutritional interventions,[114] herbal medicines, massage,[85] or combinations thereof.[115] In recent years, a number of whole-practice outcomes studies demonstrate benefit of integrative approaches, particularly in chronic pain,[32,34,35,116–118] Type 2 diabetes,[33] and cardiovascular risk markers.[119] These findings suggest public health benefits as well as possible cost savings.[8,119]

Stress and Mind–Body Medicine

Integrative medicine tends to emphasize the importance of psychological stress and its impact on overall health.[51] The evidence is robust and broad-based; psychological stress leads to poorer health outcomes—encompassing infectious and chronic disease, morbidity and mortality, and developing illness as well as recovery.[120]

Psychological states can also be beneficial; the presence of "positive emotions" has been shown to predict better health and outcomes.[121–123] Personality aspects such as commitment to self, an attitude of concern for the environment, a sense of meaningfulness, and an internal locus of control are all associated with decreased illness in high-stress environments.[124]

Contextual factors and the therapeutic relationship are important factors in the overall effectiveness of a therapy, especially with subjective outcomes such as in chronic pain syndromes,[125,126] and perhaps stronger with CAM approaches associated with elaborate rituals and distinct contexts.[127] There is an ethical imperative to provide therapeutic options that are safe and effective for symptomatic relief, with appropriate informed consent, without endorsing approaches that are unsafe or ineffective.[128] There is an emerging literature on the psychobiology of the placebo effect, with clinically significant effects demonstrated in a variety of contexts.[127,129,130] Intentional use of placebo in clinical practice is routine,[131] with complex ethical implications.[127]

Integrative medicine offers a framework that incorporates psychoemotional factors as integral to overall health with the resultant emphasis on mind–body therapies.[132] These factors are often perceived to be overlooked in conventional clinical practice and medical education,[133–136] or challenging to practically address in hurried medical visits resulting from financial constraints of the current health delivery system.[53–55]

Evidence and Integrative Medicine

As integrative medicine often incorporates approaches outside of mainstream care where evidence is weak or speculative, a systematic method in addressing "unconventional therapies" is warranted.[4] Where strong evidence supporting a particular approach exists, that should be recommended in preference to others. The more ambiguous it is as to which might be the most appropriate therapeutic choice, the more important it is to consider a hierarchy of evidence, incorporating safety, effectiveness, alternatives, and the evidence supporting each Tables 1 and 2). For some medically unexplained syndromes, such as fibromyalgia or chronic fatigue syndrome, a definitive therapy does not exist, and the best available treatments are those safe and possibly effective. Integrative medicine expands patient options at this end of the evidence hierarchy, where options are generally most needed. Any therapy that a patient refuses to use is ineffective, regardless of the evidence supporting its use.[4]

A common framework to assess the clinical appropriateness of a particular CAM intervention has been published in multiple venues.[128,137,138] Therapies that are both safe and effective are generally recommended, whereas those that are unsafe and ineffective are avoided and discouraged. Areas where either (but not both) safety or efficacy is questioned should be approached with

Table 1. Benefit and Risk Ratio and Selection of Therapies[a]

	Effective	
Safe	**Yes**	**No**
Yes	Use	Tolerate
No	Monitor	Avoid

[a]From Cohen and Eisenberg[128]

Table 2. The Clinical Applications of Research Evidence Construct[a]

Safety	Efficacy	Science	Other therapeutic options	Patient preference	Cost / accessibility	Utilization frequency of treatment in question
High	High	Decisive	None that is superior	Prefers recommended approach	Not a concern	Always
Probable	Possible	Unclear	None/few	Anything that will work	Needs consideration	Often
Low	Low	Absent/ opposed	Many that are superior	Anything that will work	Prohibitive	Never

[a]Adapted and expanded from Katz and Ali.[4]

caution. A rational expectation of benefit, based on weak clinical trial evidence or biological plausibility, may be desirable in cases where more evidence-based treatment options are unavailable or undesirable, or when patient preference drives the consideration of a particular intervention. Table 1 illustrates this decision framework.

The authors[4] have also developed a similar framework to guide clinical recommendations in the context of indefinite research. The expanded Clinical Applications of Research Evidence construct, in Table 2, highlights the practical, and practice-oriented, implications of this interface. These frameworks serve as guides to systematically assess treatment options; clearly, clinical judgment is much more nuanced. Furthermore, there may be challenges in implementing an evidence-based framework for providers that believe therapeutic choice is intuitive and uncompromisingly individualized.[139,140]

This framework suggests that clinical application of "evidence" depends on six considerations: the relative safety of a given intervention; its relative effectiveness; the quality and quantity of the supporting evidence; the availability of other treatment options for the condition; cost/accessibility (including insurance coverage, out-of-pocket expense, practicality, availability of reliable providers); and patient preferences. When a treatment approach is unsafe, ineffective, poorly supported by science, less effective than other options, cost prohibitive, and not uniquely compatible with patient preference, it should never be used. When a treatment is safe, effective, supported decisively by science, better than any other therapeutic option, readily accessible, and preferred by a patient, it should always be used. Challenges occur when options reside in between, such as when the approaches supported by the best science have all been tried, and have all failed. What remains is a treatment that is apparently safe, possibly effective, cost neutral, and desired by the patient, but not definitively supported by the available research evidence.[4]

When evaluating any potential clinical intervention, there is an implicit (or explicit) assessment of risk versus benefit. Efficacy is generally the major component of the benefit assessment (but not the only benefit; for example, psychological benefit can occur even in the absence of other clinical effects), whereas safety concerns are the primary risk (but not the only risk; for example, there is economic harm when using a safe but ineffective intervention).

Conclusions

The overlap of integrative medicine with preventive medicine is noteworthy. At the level of primary prevention, a number of approaches can contribute to health promotion. Minimally, these encompass lifestyle counseling, dietary guidance, stress mitigation techniques, interventions to improve sleep quality, and use of natural products for health promotion. At the level of secondary prevention, approaches such as stress management and lifestyle interventions are germane, as are interventions that facilitate use of conventional therapies for risk attenuation. At the level of tertiary prevention, the full range of complementary health approaches pertain to such goals as pain management, symptom control, stress relief, disease management, and risk reduction.

To some extent, a conventional medical system that has emphasized the diagnosis and treatment of disease with ever-increasing degrees of specialization has marginalized both preventive medicine and the holistic view that is central to integrative medicine. The importance of disease prevention/health promotion is gaining increasing recognition, due in part to economic forces molding the evolution of modern health care.[141–144]

As integrative medicine tends to be philosophically aligned toward environmentalism[25] and social justice,[145] as well as being particularly concerned with iatrogenesis (adverse effects of medical treatment),[146] the interface of integrative medicine and primordial and quaternary prevention becomes apparent. Integrative medicine thus offers the promise of more-expansive means to achieve

the desired ends of preventive medicine, but also imposes the challenges of assessing evidence across that broader expanse.

With patients increasingly interested in complementary and integrative approaches and conventional practitioners often uninformed or reticent, a system of unintegrated or, worse, disintegrated health care prevails in the U.S. Some conventional physicians actively discourage the use of CAM wholesale, without considering the differences in approaches or practitioners—or the potential value of integrative care. CAM-oriented practitioners may be just as apt to discourage the use of standard preventive interventions of conventional medicine, citing its reliance on pharmaceuticals and invasive procedures, a failure to respect nature, a systemic lack of compassion and patient centeredness, and financial conflicts of interest.[147,148] It is noteworthy that conflicts of interest (financial and non-financial) and ethical challenges are prevalent in a number of CAM arenas such as providers profiting from dietary supplement sales and laboratory testing.[149–151] There is real danger here of patients toppling into the divide, with attendant squandering of the potential for disease prevention and health promotion.

The Integrative Medicine in Preventive Medicine Education project was designed to introduce preventive medicine residents to integrative medicine to enhance the education and practice of preventive medicine,[152] implying a unidirectional positive influence of integrative medicine. This is also an opportune time to encourage a bidirectional exchange of ideas where preventive medicine can enhance integrative medicine. In particular, fundamentals of preventive medicine training and practice—biostatistics, epidemiology, research into causes of disease in population groups, the practice of prevention in clinical medicine, and planning and evaluation of health services[153]—can improve aspects of CAM and integrative medicine in such areas as childhood vaccines and encourage the critical evaluation of prevalent practices. Indeed, recent national initiatives to limit pharmaceutical industry influence in medical education (PharmFree),[154] better disclosure of financial conflicts of interest (Sunshine Act),[155] and purging low-value practices from medical specialties (Choosing Wisely)[156] can serve as models to improve CAM and integrative health care. Implementing U.S. Food and Drug Administration good manufacturing practices for dietary supplements can mitigate risk of contamination and poor quality control.[157] Incorporating emerging findings from clinical and neurobiological[158] research of contextual and placebo effects can enhance the delivery[159] and understanding of some CAM approaches. Overall, the application of preventive medicine principles and recent quality improvement initiatives can strengthen integrative medicine in the context of a healthcare system moving to value-based care.[144]

Recent outcomes research on models (or "whole systems") of integrative care[32–35,116–118] demonstrate promise and innovation, as well as potential cost savings,[8,119] despite a lack of large-scale funding[160,161] and methodologic challenges.[162–164] Practice-based research networks of integrative medicine centers are now adding to the literature on community effectiveness of integrative medicine for chronic pain[116] and cancer care.[165] Initiatives in integrative practices in underserved communities[166–168] demonstrate a public health orientation beyond the more educated and affluent demographics historically associated with CAM. Furthermore, the Patient-Centered Outcomes Research Institute, established by Congress in the Patient Protection and Affordable Care Act of 2010,[169] is focused on patient-centered comparative clinical effectiveness research and includes explicit stipulations for research on "integrative health practices."[169] Relevant PCORI-funded research focused on chronic pain in underserved communities include studies in acupuncture[170] and integrative group visits.[171] Some posit that these emerging findings can influence the current healthcare system to be both more value driven and more aligned to integrative principles.[172]

The ultimate goal of integrative medicine should be to make the widest array of appropriate options available to patients. Appropriateness should be predicated on fundamental considerations that pertain equally to conventional and CAM practice: treatment safety and treatment effectiveness. Treatment safety and treatment effectiveness must, in turn, be interpreted in light of the available evidence.

Evaluating the current state of integrative medicine and preventive medicine leads to a number of fundamental research questions that can address essential gaps. The role of integrative medicine in areas germane to primary and secondary prevention needs to be better assessed in terms of rates of uptake of clinical preventive services, as well as the ability to demonstrably improve diet, physical activity, and smoking-cessation efforts. The question of whether integrative clinicians model healthy behavior and influence their patients in comparison to other clinicians is relevant, as well as cost-effectiveness studies of integrative practices in high-priority areas such as pain management and adjunctive cancer care.[173]

But even in the absence of evidence, health care is not advanced by failing to adequately treat symptoms, engage patients in a therapeutic alliance, control disease progression, or produce satisfaction.[4] The simple argument supporting integrative care is that modern medical science and knowledge, despite profound successes, comprises

far less than patient need. Integrative care is not a comprehensive solution, but does expand the array of patient options, and can increase the likelihood of success that can be assembled across the stages of prevention.[4]

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